

**Glenrose Rehabilitation Hospital
12th ANNUAL SPOTLIGHT ON RESEARCH BREAKFAST
& POSTER SYMPOSIUM**

Abstract/Poster List

Alberta Ballroom, Edmonton Expo Centre at Northlands
7515 -118 Avenue, NW, EDMONTON, AB
Thursday, October 20, 2016



**Alberta Health
Services**



**UNIVERSITY OF
ALBERTA**

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Deforge, Shannon	SORB16-19	Walking The Talk: Using Principles Of HealthChange® To Put Families First In Setting Goals
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POSTER ABSTRACTS

**On behalf of the Spotlight on Research Breakfast Committee,
we would like to thank everyone who
submitted poster abstracts to this year's event.
Without your support, this poster symposium would
not have been possible!**

Note: Abstracts numbered with: (AR) = Applied Research stream; (CI) = Clinical Innovation stream.

DISCLAIMER: While the abstracts have been slightly modified for consistency, each abstract has been predominantly printed exactly as originally submitted.

SORB16-01 (AR)**A NOVEL PARENT REPORT QUESTIONNAIRE OF EARLY SIGNS OF ASD: AUTISM SPECTRUM SCREEN FOR INFANTS**

Dr. Lori-Ann Sacrey, Autism Research Centre, Glenrose Rehabilitation Hospital;

Dr. Lonnie Zwaigenbaum, Autism Research Centre, Glenrose Rehabilitation Hospital/Department of Pediatrics, University of Alberta

Background: Identifying early impairments in children who will subsequently be diagnosed with Autism Spectrum Disorder (ASD) is crucial to ensure that they gain timely access to interventions that will improve functional outcomes. **Objective:** To examine whether parent report on a novel screening tool, the Autism Parent Screen for Infants (APSI), distinguishes high-risk infants ('HR'; older sibling with ASD) who were diagnosed with ASD at 36 months from other HR and low-risk infants ('LR'; no family history of ASD) on repeat assessments from ages 6 to 24 months. **Method:** *Participants:* HR siblings who (1) did not receive an ASD diagnosis (HR-N) or (2) who did receive an ASD diagnosis (HR-ASD) and infants without a family history of ASD (LR). *Parent Report Questionnaire:* The APSI is a parent-report questionnaire on items inquiring about eye contact, responding to name, and language among others. Parents completed the APSI at 6, 9, 12, 15, 18 and 24 months. *Statistical Analyses:* Linear mixed modeling with Group and Age as independent measures and total score as the dependent measure. **Result:** Total score differentiated the HR-ASD group the other groups at each age assessed ($q \leq .036$). Estimates of sensitivity, specificity, and positive, and negative predictive validity indicate the APSI's ability to distinguish between HR infants who will and will not be diagnosed with ASD across all ages assessed. **Conclusion:** The APSI shows promise as a simple, low-cost parent-report monitoring system, which can lead to earlier identification of symptoms and access to interventions to remediate atypical development in children at risk for ASD.

SORB16-02 (AR)**USING EYE-TRACKING AS A METHOD FOR EVALUATING FUNCTIONAL TASKS TO IMPROVE UPPER LIMB PROSTHESES**

Mr. Ewen Lavoie, Action in Complex Environments Lab, BLINC Lab, University of Alberta;

Dr. Jacqueline Hebert, BLINC Lab, Faculty of Medicine & Dentistry, University of Alberta, UA/GRH Joint Appointment Researcher;

Dr. Craig Chapman, Action in Complex Environments Lab, BLINC Lab, University of Alberta

Background: Advanced myoelectric devices still require significant attention from the user. Where a person looks says much about what they are thinking. Thus, studying eye movements has become critical to studying behavior, and can be applied to prosthetic use. **Objective:** We studied eye movements in two tasks mimicking real-world demands, establishing a normative characterization of functional eye gaze with current data collection being done to test whether prosthetic users with limited sensory feedback exhibit substantially different eye gaze patterns. **Method:** Our eye-tracking headset is equipped with an HD video camera that records a first-person view of the scene, and two pupil cameras. In this experiment, each participant performed 20 trials of two tasks. Data analysis identified specific areas of interest (AOIs): e.g. the hand, pasta box, cups, placement locations, etc.) which are visible in the gaze overlaid scene video. **Result:** Able-bodied participants demonstrated a very prominent "look-ahead" fixation, where the eyes fixate on the object that the hand will interact with in the future. From preliminary results, in contrast prosthetic users focus more visual attention on the current location of their terminal device. **Conclusion:** As new prostheses are developed, including some that are able to provide sensory feedback to the user, proper assessment is crucial in determining which technologies should proceed to clinical application. One way to do this is to compare to normative function. The normative dataset from this study can be used as a baseline against which to compare prosthetic technologies.

SORB16-03 (AR)**PREVALENCE OF CEREBRAL PALSY IN NORTHERN ALBERTA: BIRTH YEARS: 2008-2010**

Dr. Florencia Ricci, Department of Pediatrics, University of Alberta/Glenrose Rehabilitation Hospital;

Dr. Charlene Robertson, Department of Pediatrics, Glenrose Rehabilitation Hospital;

Kathleen O'Grady, Department of Occupational Therapy, Glenrose Rehabilitation Hospital;

Dr. Maryam Oskoui, Department of Pediatrics and Neurology & Neurosurgery, McGill University;

Dr. Helly Goetz, Department of Pediatrics, University of Alberta;

Dr. Jerome Yager, Department of Pediatrics, University of Alberta;

Dr. John Andersen, Department of Pediatrics, Glenrose Rehabilitation Hospital

Background: Our study reports the Northern Alberta (NAb) 2008-2010 birth cohort of the Canadian Cerebral Palsy Registry. **Objective:** 1) To determine the overall population-based prevalence of CP among five-year-old children in Nab (birth years 2008-2010). 2) To describe the motor sub-type and function of these children at age five years. 3) To describe the motor sub-type and function of these children at age five years. **Method:** In NAb, the Glenrose Rehabilitation Hospital, assesses and treats almost all children with CP. Diagnoses were confirmed at age five years. The denominator was determined from Government of Alberta data. Prevalence is

given per 1000 five-year-old children in NAb using 95% confidence intervals (CI). Function was measured with the GMFCS. **Result:** For the birth years 2008-2010 there were 173 five-year-old children living in NAb with confirmed CP, overall prevalence rate for the 3-year period of 2.22(95%CI 2.12, 2.32) per 1000 living children age five years. Of these, 9 (5.2%) children had post-neonatal CP. Of 169 children (4, data missing) (57% male) motor sub-types are: spastic 148(87.6%) (hemiplegia 50%, diplegia 20.9%, triplegia 6.8%, quadriplegia 22.3%); dyskinetic, 18(10.6%); and ataxic, 3(1.8%). Of all 169 children, 74(43.8%) have unilateral CP. Function: GMFCS I/II, 107(63.3%); MACS I/II, 111(65.7%). **Conclusion:** The current CP prevalence in NAb is similar to published rates. The high proportion of unilateral CP follows current trends. The reduced prevalence in the last year of the study merits further investigation.

SORB16-04 (CI)

FILLING A VOID: BUILDING A COLLABORATIVE ADULT AUTISM SPECTRUM DISORDER SERVICE

Elizabeth Kelly, Communication Disorders, Glenrose Rehabilitation Hospital;

Dr. Cyndie Koning, HIT Core Member, Glenrose Rehabilitation Hospital;

Val Guiltner, Pediatric Rehabilitation, Glenrose Rehabilitation Hospital;

Kevin Payne, Advisory Committee Member

Background: Alberta faces a crisis due to barriers to access of appropriate health services for adults with Autism Spectrum Disorder (ASD). A pilot adult ASD service is beginning to address this need. With support from the Sinneave Family Foundation, a collaborative service model was developed that engaged stakeholders including families of adults with ASD, adults with ASD, clinicians at the Glenrose Rehabilitation Hospital, the Edmonton Oliver Primary Care Network, and AHS Mental Health Services. **Objectives:** a) Champion a person-centered approach to medical care for adults living with ASD, b) Provide consultation on medical management, c) Build capacity with primary care providers, d) Develop a diagnostic service for adults **Method:** Key values include: a) person/family-centered care; b) sensitivity to the specific needs of persons with ASD; c) responsiveness and accessibility; d) capacity building; d) scalability and sustainability; e) evidence-informed/evidence-generating practices. Measures include number of referrals for consultation and diagnosis, number of capacity building educational sessions, and outcome measures such as patient/family perceptions of services and wait-Qualitative outcome evaluation will help further inform ongoing quality improvement. **Results:** Initial results support the ongoing need for diagnostic services given increasing number of referrals, positive patient/family perceptions of services, and increased knowledge of ASD by community healthcare professionals. **Conclusion:** The intention of the service design is that it will be replicable across other jurisdictions. The current model attributes much of its potential for scalability to deliberate consultation with key stakeholders in developing a toolkit to build capacity in primary care and other services providers.

SORB16-05 (CI)

BUILDING CAPACITY: TOOLKITS TO SCALE HEALTHCARE SERVICES FOR ADULTS WITH AUTISM SPECTRUM DISORDER

Dr. Cyndie Koning, HIT Core Member, Glenrose Rehabilitation Hospital;

Elizabeth Kelly, Communication Disorders, Glenrose Rehabilitation Hospital;

Val Guiltner, Pediatric Rehabilitation, Glenrose Rehabilitation Hospital

Background: In partnership with Edmonton Oliver Primary Care Network (EOPCN), we have successfully piloted the Adult Autism Spectrum Disorder (ASD) primary care medical home and consultation model. We now want to build capacity for similar services across other jurisdictions. The creation of an educational toolbox will facilitate access to the knowledge and skills needed to provide healthcare services for adults with ASD. **Objective:** The objective is to develop skills and knowledge to work with this population and to promote development of informed, accessible services. The toolbox will: a) Provide information about ASD; b) Promote ASD friendly office and clinical environments; c) Provide information about common co-morbid conditions; d) Describe mental health issues; e) Educate prescribing medical personnel regarding psychopharmacology. **Method:** Toolbox development will include: a) Determining content for video modules and print materials; b) Engaging with consumer/clients and providers to ensure needs are met; c) Planning for coaching and mentoring; d) Developing an evaluation plan; e) Hiring a video producer; f) Creating online community accessibility. **Result:** Our pilot included interactive presentations to a target clinic within EOPCN by well-recognized experts working with individuals with ASD. Feedback from these initial modules was positive but scaling this information across the Edmonton region will only be possible through development of toolkits. **Conclusion:** Adults with ASD have unique and complex medical needs that will be addressed by increasing the capacity of primary care health professional to provide informed, evidence-based services.

SORB 16-06 (CI)
BUILDING AN ADULT ASD DIAGNOSTIC CLINIC

Elizabeth Kelly, Communication Disorders, Glenrose Rehabilitation Hospital;
Dr. Cyndie Koning, HIT Core Member, Glenrose Rehabilitation Hospital;
Val Guiltner, Pediatric Rehabilitation, Glenrose Rehabilitation Hospital;
Kevin Payne, Advisory Committee Member

Background: Provision and access to adult diagnostic services within the Edmonton Zone, Province of Alberta and across North America are relatively sparse. There is a lack of expertise to identify adults with ASD including screening and diagnostics. An environmental scan and a review of best practice guidelines for diagnosis of ASD in adults were completed in 2014 and a model of diagnostic service delivery was developed. The model underwent a pilot phase which included stakeholders with appropriate expertise. **Objectives:** a) To pilot a model of service delivery for the diagnosis of ASD in adults. b) To evaluate both the process, beginning with the referral, and the client outcomes which included identifying ongoing support needs. **Method:** Methodology for implementation of the service delivery model was supported by the adult ASD advisory committee and professionals with experience in adult ASD diagnosis. A process map was developed to outline the steps in diagnosis. The implementation framework addressed all the systems necessary including, for example, space, scheduling, referral forms, documentation, assessment materials, and staffing requirements. **Results and Conclusion:** The pilot has been underway since December 2015 and more than 50 adults have undergone a diagnostic assessment. Evaluation is currently underway but initial response to the service is promising, suggesting that patients and physicians now have accessible, appropriate, acceptable, and efficient adult ASD diagnostic services.

SORB 16-07 (CI)
THE GLENROSE REHABILITATION HOSPITAL'S HEALTHCARE IMPROVEMENT TEAM: AN INNOVATIVE MODEL FOR SUPPORTING QUALITY IMPROVEMENT

Dr. Jennifer Klein, HIT Core Member, Glenrose Rehabilitation Hospital;
Dr. Cyndie Koning, HIT Core Member, Glenrose Rehabilitation Hospital;
Alyson Kwok, HIT Core Member, Glenrose Rehabilitation Hospital;
Laura Mumme, HIT Core Member, Glenrose Rehabilitation Hospital

Background: As Alberta's healthcare system undergoes transformational growth and change, it becomes increasingly important to ensure staff are supported to provide high quality and efficient patient care. While there are many ongoing research, quality improvement, knowledge mobilization projects and outcome evaluations at the Glenrose Rehabilitation Hospital (GRH), the hospital had neither a common conceptual framework, nor the infrastructure to support an integrated approach to these activities. **Objective:** The aim is to share an innovative and collaborative approach that supports evidence-based clinical practice. **Method:** The Healthcare Improvement Team (HIT) was conceptualized by consulting with diverse stakeholders from research services, quality improvement, senior leadership and professional practice leads. **Result:** The HIT provides support for GRH staff conducting clinical research, quality improvement, and evaluation. HIT also supports teams who want to implement best practice guidelines and research into their clinical work. The HIT is comprised of 2.5 dedicated FTE and additional team members representing Nursing, Research and Technology Development, Research Services, Knowledge Management and faculty members from the University of Alberta. Since its inception in 2014, HIT has been involved in 31 GRH projects, supported 18 clinical teams to move research into practice, and delivered more than 25 presentations and workshops to build capacity within the Glenrose. **Conclusion:** The HIT model has benefited the GRH by using an integrative and collaborative approach to enhancing care, and has increased the capacity of staff and programs to engage in this work. Capacity building across the site will be crucial for maximizing impact with our current resources.

SORB16-08 (AR)
THE INFANT-TODDLER SOCIAL AND EMOTIONAL ASSESSMENT AS AN EARLY DETECTION TOOL FOR AUTISM SPECTRUM DISORDER

Sarah Raza, Faculty of Medicine & Dentistry, Department of Pediatrics, University of Alberta;
Lori-Ann Sacrey, Faculty of Medicine & Dentistry, Department of Pediatrics, University of Alberta;
Dr. Lonnie Zwaigenbaum, Autism Research Centre, Glenrose Rehabilitation Hospital/Faculty of Medicine & Dentistry, Department of Pediatrics, University of Alberta

Background: Understanding the atypical development of children diagnosed with Autism Spectrum Disorder (ASD) in the first three years of life is crucial to identify early risk markers. Early social-emotional difficulties may predict later developmental problems, highlighting the need for early screening of these concerns in at-risk ASD infants. One method of identifying social-emotional

atypicalities is the parent-report tool, Infant-Toddler Social Emotional Assessment (ITSEA). **Objective:** This study prospectively examined the ability of the ITSEA, in a cohort of infants at high-risk (HR) of developing ASD, to predict ASD symptomology and diagnostic outcomes at 36 months. **Method:** Three groups were examined: HR siblings who received an ASD diagnosis at 36 months (HR-ASD), HR siblings who did not receive an ASD diagnosis at 36 months (HR-N), and infants with no ASD family history (LR). Parents completed the ITSEA at 18 months. At 36 months, a diagnostic ASD assessment was conducted using the ADI-R and ADOS. **Result:** HR-ASD infants scored higher on the Internalizing and Dysregulation domains and Maladaptive and Atypical indices, and lower on the Competency domain and Social Relatedness index at 18 months compared to HR-N and LR infants. All ITSEA domains and indices predicted ASD symptom severity in the HR sample on the ADI-R, but only the Competency domain and Atypical and Social Relatedness indices predicted symptom severity on the ADOS at 36 months. **Conclusion:** Parent-report using the ITSEA can facilitate earlier detection of social-emotional symptoms characteristic of ASD in HR infants and may serve as a tool in predicting later diagnostic outcomes.

SORB16-09 (CI)

DEVELOPMENT OF THE AUTISM SOCIAL PARTICIPATION CLASSIFICATION SYSTEM FOR PRESCHOOL CHILDREN WITH AUTISM SPECTRUM DISORDER

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Dr. Sandy Hodgetts, Faculty of Rehabilitation Medicine, Department of Occupational Therapy, University of Alberta/GRH Research Affiliate

Dr. Joyce Magill-Evans, Faculty of Rehabilitation Medicine, University of Alberta/GRH Research Affiliate;

Jordana Hildebrandt, Autism Research Centre, University of Alberta;

Michael Stolte, Centre for Autism Services Alberta;

Sue Mitchell, Children's Autism Services of Edmonton;

Krista Wennerstorm, GRIT Program;

Dr. Carole-Anne Hapchyn, Faculty of Medicine & Dentistry, Departments of Pediatrics and Psychiatry, University of Alberta

Background: Preschool children with disabilities, particularly those with Autism Spectrum Disorder (ASD) have an increased risk of restricted social participation. Current assessments measure symptoms of ASD but do not describe a child's social participation abilities. A classification system places a child along a continuum based on average social participation in comparison to age-matched peers with ASD. To date, no classification systems have focused on social participation, which is central to their involvement and engagement in a variety of meaningful activities. **Objective:** To develop, refine, and begin validation of the Autism Social Participation Classification System (ASPCS) for preschool-aged children with ASD. Using a modified nominal group technique, focus groups of experts and a parent helped develop the ASPCS. Next, a national online Delphi process was utilized to refine and validate content of the ASPCS. **Result:** Based on stakeholders' perspectives collected during three rounds of Delphi process, the ASPCS has three components of social participation: *Behaviour*, *Social Desire*, and *Activities & Environment*. Five levels of abilities and supports emerged within each component that are clinically meaningful and distinct. Consensus for each level ranged from 80.5% to 97.6%. **Conclusion:** The ASPCS provides a snapshot of a child's abilities to socially participate based on their *Behaviour*, *Social Desire* and *Activities & Environments*. With further validation, it can provide information to support goal setting and intervention for families and clinicians.

SORB16-10 (AR)

SPATIAL AND TEMPORAL DETERMINANTS OF TRUNK MUSCLE ACTIVATION DURING CONTINUOUS MULT-DIRECTIONAL PERTURBATIONS

Fatemeh Gholibeigian, Faculty of Engineering, Department of Mechanical Engineering, University of Alberta;

Andrew Williams, Faculty of Engineering, Department of Biomedical Engineering, University of Alberta;

Justin Lewicke, Synrcrude Centre for Motion and Balance, Glenrose Rehabilitation Hospital;

Dhruv Prakash, University of Alberta;

Dr. Albert Vette, Faculty of Engineering, Department of Mechanical Engineering, UA/GRH Joint Appointment Researcher

Background: Trunk instability causes functional impairments and secondary health problems following spinal cord injury (SCI). One of the key priorities for individuals with SCI is therefore to improve their trunk control and, consequently, quality of life. However, to enhance existing therapies and assistive technologies, a better understanding of trunk control in healthy individuals is needed.

Objective: The objective of this study is twofold: (1) characterize trunk muscle activation patterns during reactive balance control; and (2) quantify the temporal relationship between muscle activity and motion, with the goal of identifying active (neural) and passive

(mechanical) control mechanisms. **Method:** 15 able-bodied participants were asked to sit on a wobble board inducing continuous multi-directional perturbations and maintain an upright upper body posture as closely as possible. Five hemispheres of various diameters were attached to the bottom of the board to induce five different levels of seat instability. Motion capture and electromyography systems were used to collect trunk kinematics and muscle activation profiles, respectively. Maximum voluntary contractions were used to normalize the EMG signals. The temporal and spatial relationships between the body kinematics and EMGs were used to characterize trunk control and stability during sitting. **Result:** Preliminary results indicate a spatial and temporal relationship between muscle activation and body movement. Measures of postural steadiness, principal component analysis, and cross-correlation analysis are currently used to quantify determinants of muscle activation and reactive trunk control. **Conclusion:** This study will advance our understanding of how healthy individuals stabilize their trunk during sitting.

SORB16-11 (AR)

QUANTIFYING INTERFACE PRESSURES IN UPPER LIMB PROSTHETIC SOCKETS

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Background: A crucial determinant of upper limb prosthetic use is the quality of fit between the residual limb and prosthetic socket. It is at the socket where the soft tissue of the user's limb must securely interface with the rigid materials of the prosthesis without discomfort. Yet quantitative understanding of this interface is absent in literature. **Objective:** To quantify the interfacial pressures between the prosthetic socket and residual limb in 4 transhumeral participants. **Method:** A TekScan VersaTek system was used. Sensors were adhered to the participant's residual limb and their anatomical locations captured with a FARO arm machine. Participant held 4 static positions and pressure data was mapped to each participants' anatomy. **Result:** Local areas of high pressure were observed in close proximity of the axilla and the distal end of the residual humerus in all participants. These results are likely due to a moment-induced rotation resulting from the weight and loading of prosthetic components. **Conclusion:** This work develops and demonstrates a methodology to quantify interfacial pressures occurring on the residual limb as a result of a transhumeral prosthetic socket. Locations and general magnitudes of the pressures can be readily extracted and interpreted to help quantitatively assess quality of socket fit.

SORB16-12 (CI)

DEVELOPMENT OF A SIMPLIFIED MOTION CAPTURE MARKER TO SET TO ENHANCE REHABILITATION IN THE CAREN SYSTEM

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Background: There are currently no standard methods of assessing gait parameters for CAREN treadmill walking. Gait assessment relies on motion capture via body-affixed markers requiring 1) a trained clinician to appropriately attach the markers to the patient, 2) a large amount of time to get the patient ready for assessment. **Objective:** We propose a simplified motion capture Cluster Marker Set (CMS) that generates sufficiently accurate gait kinematics while allowing fast and easy marker attachment by clinicians accessing the CAREN. **Method:** After attaching two marker sets –a standard Helen-Hayes Marker Set (HMS) and the CMS–, each participant walked continuously in the CAREN system for 250 m. Joint kinematic time series from ten consecutive steps were calculated and analyzed separately from both marker sets. Statistical comparisons were made for joint kinematics averaged within four bins defined to represent heel-strike, mid-stance, take-off and mid-swing. **Result:** We compared joint kinematic data as measured with both marker sets. Differences between both sets were found to be small and contained within normal gait variation limits for all joints (hip, knee and ankle) in the sagittal plane. Although differences were not that small in the transverse and frontal planes, they were still within normal gait variation limits. **Conclusion:** The results from this study suggest a novel, clinically usable simplified marker set and gait analysis protocol for the CAREN system. It will not require specialized expertise in anatomical marker placement and yet provide reliable kinematics data to be used during assessment and rehabilitation sessions on the CAREN.

SORB16-13 (CI)**DEVELOPMENT OF AN INSTRUMENTED MECHANICAL CUP FOR FUNCTIONAL EVALUATION OF PROSTHETIC FEEDBACK**

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Background: The BLINC lab is developing a suite of tasks to evaluate the effectiveness of sensory feedback systems incorporated into prosthetic devices, with a focus on keeping tasks functional and representative of the real world. By instrumenting an object, we can measure applied forces and use this measure to quantify effectiveness of sensory feedback systems. **Objective:** To develop an instrumented cup which is able to measure applied forces, wirelessly transmit and log data to a graphical user interface, and output audio and visual feedback to the user if errors are detected. **Method:** An instrumented mechanical cup has been developed using an embedded systems design approach, from concept development through to component selection, design analysis, and evaluation of a prototype through benchtop testing. **Result:** The cup is able to measure applied forces to within an accuracy of 12%, tilt angles to within 5°, and acceleration in all directions. Data is transmitted via Bluetooth to a custom designed GUI, which allows for data logging and error threshold selection. Other design factors that were evaluated, include temperature, battery life, size, and weight. Device components cost less than \$1000. **Conclusion:** The instrumented cup meets and exceeds most of the design requirements. Further revisions may include investigating alternate materials to improve stiffness and refining the electronics design. Future testing will be needed to evaluate its usefulness as a tool for investigating the effectiveness of sensory feedback systems.

SORB16-14 (AR)**IMPLEMENTING BEST PRACTICES FOR SENIORS' MENTAL HEALTH (MH) USING IMPLEMENTATION SCIENCE FRAMEWORKS**

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Background: Early identification and treatment of mental health conditions in older adults contributes to better health outcomes and is considered best-practice. Systematic knowledge transfer is essential to successful implementation of best-practices into clinical settings. **Objective:** To use the National Implementation Research Network (NIRN) evidence-based implementation science frameworks to identify and implement best-practices for mental health assessment and treatment on geriatric inpatient physical rehabilitation units; with an initial focus on assessment. **Method:** NIRN *Stages of Implementation* framework guided implementation activities through four stages: Exploration, Installation, Initial Implementation, and Full Implementation. Delphi Method was used to guide evaluation, ranking, and selection of best-practice statements. NIRN *Practice Profiles* were used to develop operational definitions of desired practices and outcomes. Using NIRN *Improvement Cycles* framework, implementation was piloted with *Plan-Do-Study-Act* cycles to refine user training methods and supporting materials prior to implementation. Progress of implementation was tracked using NIRN *Stages of Implementation* tool. Success of implementation was evaluated through user-feedback gathered via surveys and informal discussions. **Result:** NIRN frameworks provided guidance to implementation teams, enabling them to: reach consensus on best-practices; identify suitable mental health screening/assessment tools for seniors; establish screening/assessment algorithms for specific mental health conditions; and develop training systems and organizational supports essential for sustaining implemented best-practices. Implementation processes and clinical-utility of tools and algorithms were rated highly by clinicians and interdisciplinary teams. **Conclusion:** Implementation science frameworks enabled successful identification and clinical application of best-practices for screening/assessment of mental health in older adults on geriatric inpatient physical rehabilitation units.

SORB16-15 (AR)**UTILIZING IMPLEMENTATION SCIENCE TO GUIDE TRAINING AND COACHING IN THE GLENROSE DRIVING EVALUATION AND TRAINING SERVICE**

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Background: Assessment in driving was restructured to reflect current evidence. Upon evaluation, 86% of Occupational Therapists (OTs) working in the Drivers Evaluation and Training Service (DETS) indicated they wanted further training in administering the clinical driving assessment. While 71% indicated that they wanted further training interpreting the clinical driving assessment. To support OTs in effectively applying evidence into the practice, National Implementation Research Network (NIRN) implementation Science was adopted. **Objective:** To facilitate evidence based training and coaching of GRH DETS OTs utilizing NIRN Implementation Science. **Method:** NIRN implementation Science system drivers were used to develop the training and coaching protocol. The training and coaching protocol included dedicated in-servicing, provision of resource binders, one on one observation of a coach followed by reverse observation of the training therapist. **Result:** In total, 6 OTs were trained in the clinical driving screen. Following training and coaching 100% of staff reported understanding their role and responsibilities in clinical driving assessment. 100% reported that coach observation and reverse observation solidified training and 100% reported receiving the right amount of coaching. **Conclusion:** The training and coaching protocol allowed for consistent and thorough training of staff. The process facilitated evaluation of staff consistency and competency which can be difficult in traditional training. Overall staff reported positive feedback with regards to the orientation and training protocol and reported enhanced understanding and confidence in administering the clinical driving screen. This protocol requires increased support for staff availability and a longer training period; however the benefits of the protocol are evident.

SORB16-16 (CI)

DOES PRESSURE MONITORING AT HOME IMPROVE PRESSURE REDISTRIBUTION KNOWLEDGE AND MANAGEMENT OF PERSONS WITH SCI?

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Background: Pressure ulcers (PU) are localized injury to the skin and/or underlying tissue as a result of pressure. Treatment of a PU is costly and impact on quality of life. Eighty-five percent of people with SCI develop at least one pressure ulcer over their lifetime. There can be wide variations in the amount of pressure at the skin surface and areas at risk, depending on patient factors and type of surface. **Objective:** To examine if using the XSensor mapping system within the hospital and home setting improves patient understanding of the management and risks of developing pressure ulcers? **Method:** This mixed method study will collect qualitative data on the perceptions of using the XSensor system and quantitative data on actual pressure distribution between hospital and home sleep surfaces. Participants (n=8-10) will be recruited from the SCI unit at the Glenrose. Education sessions on pressure points and management will occur at the Glenrose and in the participant's home. The intervention will consist of the Xsensor continuous pressure mapping mattress overlay placed under the participant on the sleep surface in the hospital and home setting. **Result:** Staff education will take place in September with patient recruitment and data collection continuing until April 2017.

SORB16-17 (AR)

REDLINER: AN ACTIVITY MONITOR FOR MANUAL WHEELCHAIR USERS

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Background: Activity monitors such as those produced by FitBit and Garmin are popular amongst the general population, however despite their usefulness in healthy living they are unsuitable for wheelchair users as they do not measure wheelchair propulsion. While the SmartWheel is an existing wheelchair activity monitor, it is prohibitively expensive and intrusive for personal use. **Objective:** The objective of this work was to create a low-cost manual wheelchair activity monitor capable of measuring parameters relating to activity level while also monitoring and notifying the user of damaging over-exertion events, fulfilling the role of personal activity monitor for wheelchair users. **Method:** The Redliner device uses a novel non-intrusive sensor which attaches to a user's wheel and measures the wheelchair's motion. A wheelchair-specific propulsion algorithm was developed which counts pushes, estimates distance travelled and time spent active, and enumerates overexertion events in real-time onboard the device. In order to evaluate the effectiveness of the Redliner device, a series of trials collecting a minimum of 3 pushes on various surfaces including linoleum, grass, gravel, and rough pavement were performed while collecting synchronous SmartWheel data. These surfaces were chosen to represent real-world wheelchair propulsion situations which could prove difficult for the device. **Result:** Kinematic data produced by the Redliner device was found to be in good agreement with the SmartWheel, with only slight losses in accuracy on extremely rough surfaces. Parameters reported by the propulsion algorithm closely matched experimental conditions. **Conclusion:** Redliner is a novel device for wheelchair users which has been proven effective for activity and over-exertion monitoring.

SORB16-18 (AR)**SUPPORTING BEST PRACTICE IN FEEDING ASSESSMENT: IMPLEMENTATION PROCESSES**

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Background: A team of pediatric occupational therapists used an implementation science framework (Fixsen et al., 2005) to promote ongoing process improvement in screening for feeding difficulties in children seen in clinic at a large rehabilitation hospital. The need for a screen arose based on inconsistent identification of feeding needs of children with complex physical rehabilitation needs. Plan-Do-Study-Act (PDSA) approach was used as part of an overall implementation plan to improve the practicality and effectiveness the feeding screen which is intended to identify children at risk for feeding issues. This poster will examine the process of using a PDSA approach to systematically identify needs, challenges and next steps. **Objective:** To implement a pilot feeding screen and evaluate its face validity in a clinical setting. To use the PDSA cycle to identify systems required to improve implementation. **Method:** The screen, developed based on the clinical expertise of 4 experienced pediatric OT's was trialed for two months with more than 60 children in a physical medicine clinic. A feedback questionnaire was developed and clinicians evaluated the screen for both content and ease of use. The implementation team collected utilization data and reviewed the feedback from the questionnaire. PDSA informed improvements to the tool and its application. **Result:** Feedback was reviewed and language adjustments to the screen were made. The implementation team identified ongoing challenges including additional training and communication systems. **Conclusion:** Using a PDSA improvement cycle was an effective method to systematically inform first steps in creating an effective feeding screen.

SORB 16-19 (CI)**WALKING THE TALK: USING PRINCIPLES OF HealthChange® TO PUT FAMILIES FIRST IN SETTING GOALS**

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Background: The Glenrose Rehabilitation Hospital (GRH) is piloting the implementation of HealthChange®, in an early intervention program using an implementation science approach adapted from the National Implementation Research Network. HealthChange® is an evidence-based patient/family-centred model of care that promotes health literacy and behaviour change by supporting and engaging families in goal-setting. **Objective:** To implement sustainable change in how clinicians, and patient's/families approach goal setting. **Method:** The team participated in a 2 day course on HealthChange® course as part of a patient centered care and self-management initiative. Once training was complete, an interprofessional implementation team was formed to determine what HealthChange® principles to implement and how. A Practice Profile tool was used to define the critical components of the practice and what the practice would look like if it was ideally implemented with fidelity. **Result:** Introducing HealthChange® principles has positively impacted the families' and clinicians' goal setting experience within 1-2-3 Go! Now, goals emphasize the role of parents/caregivers as key agents of change. Goal-setting has become increasingly family focused and more dynamic conversations empower caregivers to identify and create their own goals, with support from clinicians. **Conclusion:** We know the importance of collaborating with families in setting goals. The systematic implementation of HealthChange® has the potential to change both clinicians' and families' behaviour in early intervention. This approach to self-management, or in this case, "family-management", engages families so that they are active participants in the goal setting process and are empowered to follow intervention recommendations to support their child's health goals.

SORB-20 (AR)**GESTURAL DIFFERENCES BETWEEN PERCEIVED GENDER GROUPS: INFORMING COMMUNICATION FEMINIZATION TRAINING FOR TRANSGENDER WOMEN**

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Background: Gender differences exist in various aspects of nonverbal communication. Measurement of these behaviors and the way they relate to perceived gender remains vastly underexplored, however, especially in the communication feminization literature. **Objective:** The purpose of this study is to determine whether upper body gestures differ between perceived gender groups. **Method:** In phase one of the study, the upper body movements of a group of 40 (n=20 transgender and n=20 cisgender) communicators will be recorded during a cartoon retell task. Participants will be outfitted with passive motion markers on the upper body joints and head and will have their movements tracked using motion capture technology in the Syncrude Centre for Motion and Balance. Seven gestural measures related to head and hand movement as well as elbow and hand positioning subsequently will be taken. In phase two, a group of observers (n=20) will watch normalized point light displays of the communicators performing the retell task and will indicate the perceived gender of each. Gestural differences between perceived gender groups will be explored using a multivariate analysis of variance. **Result:** We hypothesize that group differences will exist and that communicators perceived to be women will: a) nod more frequently; b) have greater amplitude of head movements (i.e., nod, tilt, shake); c) use hand movements that travel greater distances; d) have a higher palm-up: palm-down ratio; and e) will keep the elbows closer together. **Conclusion:** The results of the study will help to inform communication feminization training for trans-identified clients.

SORB16-21 (CI)

NORMATIVE KINEMATIC DATA FOR TWO FUNCTIONAL UPPER LIMB TASKS

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Background: Performance of clinical functional tasks is often quantified via time to completion of the task. While this outcome metric provides a useful measure for efficiency, it is not sensitive to compensatory joint patterns often employed by individuals with upper limb impairments. Such compensatory movements are essential to detect as they may increase the risk of joint injuries. Through the addition of a multi-body kinematic assessment, clinical functional tasks may be altered to provide a new breadth of outcome metrics to assess upper body function. **Objective:** The objective was to create a comprehensive set of normative upper body kinematics for two functional tasks that can be used as a benchmark for clinical assessments. **Method:** 20 participants performed 20 trials of two functional upper limb tasks, a pasta box task and cup transfer task. Data was collected using a 12-camera VICON motion capture system. Participants had rigid plate, retro-reflective markers affixed to their upper body and pelvis. Angular and end-effector kinematics were computed from low-pass filtered data using custom written MATLAB code. **Result:** The following joints were included in the analysis: shoulder, elbow, wrist, and trunk motion. Task duration and various end-effector metrics were calculated: hand trajectory and velocity, grip aperture, and number of movement patterns during the tasks. **Conclusion:** The results of this study have high clinical significance as they provide an extensive summary of normative upper body kinematics during functional tasks. These norms will be used as a benchmark for assessing upper limb impairments, advanced assistive technologies, and performance improvements over time.

SORB16-22(AR)

ACCURACY AND PRECISION OF MOTION CAPTURE CAMERAS FOR IDIOPATHIC SCOLIOSIS IMAGE GUIDANCE SYSTEM

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Background: Adolescent idiopathic scoliosis is a 3-dimensional spinal deformity involving lateral curvature and axial rotation of the spine. Severe cases require spinal fusion surgery involving insertion of pedicle screws into the spine. Insertion of screws requires high accuracy to prevent damage to the spinal cord and blood vessels. Errors of less than 1mm and 5° of rotation have been suggested as minimum accuracies for screw insertion. This study proposes to use motion capture system to track surgical tools to provide image guidance. **Objective:** Determine the precision and accuracy of the Optitrack motion capture system for usage in spinal fusion surgery. **Method:** A motion capture system with three Optitrack Prime 13W was tested in a mock operating room set-up. A static rigid body was recorded to determine the precision of the system over six hours. Translational and rotational accuracy were tested by moving the rigid body at pre-determined distances and angles. **Result:** Six hours of static testing showed a precision of 0.01-0.12mm, improving to 0.005-0.01mm when a 1-hour pre-heat was completed. Rotational precision was 0.01-0.02 regardless of pre-heating. Translational accuracy was 0.15-0.26mm for 5cm translation versus 0.20-0.43mm for 12cm translation. Accuracy of small rotations between 5-10° were 0.3-1.3° while large rotations of 70-75° had accuracies of 1.5°-10.4°. **Conclusion:** The precision of the motion capture system is

excellent after a one-hour warm-up time. The translational and rotational accuracy are adequate for small translations and rotations. Future work will involve integrating motion capture with ultrasound to reproduce 3D images of the spine for image guidance.

SORB16-23(AR)

AN INSTRUMENTED WOBBLE BOARD FOR ASSESSING AND TRAINING SEATED BALANCE DURING CONTINUOUS PERTURBATIONS

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Background: Seated postural control can be compromised due to neuromuscular impairments, resulting in difficulty to maintain upright seated posture, decreased functional independence, and secondary health complications. In standing, sensory augmentation has been shown to provide valuable feedback on body sway to effectively complement native sensory information and enhance balance abilities. However, it is not clear whether such sensory augmentation is also effective in improving dynamic sitting balance, e.g., following stroke. **Objective:** The first objective of this study was to construct a sitting apparatus that provides directional, vibrotactile feedback to seated humans undergoing continuous, multi-directional perturbations. The second objective was to explore whether vibrotactile feedback improves the ability of healthy people to maintain seated balance for such perturbations. **Method:** The lab-constructed sitting apparatus was equipped with an inherently unstable base and directional, vibrotactile feedback instruments. 12 healthy, young participants completed a series of twelve 30-second dynamic sitting trials each, assessing the effect of sensory feedback (on or off) in both eye open and closed scenarios. The angular displacements of the sitting apparatus were measured and recorded. **Result:** All participants completed the experimental protocol. Statistical tests revealed that certain kinematic measures were significantly different between trials with feedback off and with feedback on. **Conclusion:** In this study, sensory feedback has been shown to improve certain kinematic measures in perturbed, seated individuals, against their own control trials. To test the utility of the developed experimental paradigm, future work will use the developed protocol in the elderly and stroke survivors, both in training and assessment paradigms.

SORB16-24(AR)

LEARNING FROM DEMONSTRATION: TEACHING A MYOELECTRIC PROSTHESIS USING AN INTACT LIMB

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Background: Rejection rates for upper-limb myoelectric prostheses are high in part because of limited functionality and unintuitive control. As the level of amputation increases, the number of muscle sites available for control decreases. Hence, users feel that artificial limbs do not respond or behave like biological limbs. **Objective:** Prosthetic arms should restore and extend the capabilities of someone with an amputation. They should move naturally and be able to perform intuitive, coordinated movements like a biological arm, e.g., catch a ball or play the piano. **Method:** Using reinforcement learning (a type of machine learning), we present a method that allows someone with an amputation to use their non-amputated arm to teach their prosthetic arm how to move through a wide range of coordinated motions and grasp patterns. We capture angles of the non-amputated wrist and finger joints using a data capture glove and a wireless myoelectric recording and inertial measurement system. During training, subjects execute the same sequence of movements in both their arms (non-amputated arm and the prosthetic device). **Result:** In our work till date, preliminary results indicate that our reinforcement learning approach allows a robotic arm to learn and mirror motions demonstrated by the human arm. **Conclusion:** We believe it's possible for prosthetic users with unilateral amputations to teach their prosthetic arm how to move using their non-amputated arm. Our results indicate that it is appropriate to move forward with myoelectric control experiments using human subjects.

SORB16-25(AR)

MONITORING THE PHYSIOLOGICAL RESPONSES OF THE KINESTHETIC ILLUSION TO IMPROVE SENSORIMOTOR PROSTHESES

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Background: A major limitation in the use of robotic prosthetic limbs is the lack of sensory feedback provided to the users; this is a major contributor to the rejection of prosthesis use. The kinesthetic illusion is being investigated as a potential feedback mechanism; it is a phenomenon characterized as the perceived movement of a limb, in the absence of a movement, when localized vibratory stimulation is applied to musculo-tendinous regions around a joint. Besides amputee subjects, the illusion is also demonstrable in able-bodied populations. **Objective:** To complement the current investigation of the kinesthetic illusion and its utility in providing valuable sensory feedback in prosthesis use, a protocol is needed to characterize physiological and psycho-physical measures that are non-invasive. Other physiological phenomena like the tonic vibration reflex may also influence a subject's sensory perception. Therefore, while developing the protocol, the validity and practical aspects of the additional measures must also be evaluated. **Method:** A literature search was first completed to elucidate the physiological mechanisms underlying the illusion, which gave insight into what type of devices or methods could be incorporated into the protocol. The most valuable techniques were determined to be electromyography, skin conductance response and temperature change for the monitoring of the reference arm, while motion capture was selected for the monitoring of the contralateral limb. The next stage involved creating a trial design for a pilot execution of the protocol which was followed by an evaluation of devices that will be used. Technical challenges, like designing a mount for the vibration factor or integrating data acquisition from the device, were also addressed. **Result:** The protocol involved a progression from theoretical concepts to a technical understanding of different techniques that can be used to collect quantitative measures of the kinesthetic illusion. The protocol is optimized to function for target sites in the upper arm, forearm, thigh and lower leg regions. The protocol can be further augmented by including a data set from its application for a few able-bodied subjects and the analytical methods that can be used subsequently. **Conclusion:** A thorough characterization of physiological responses will help in manipulating the illusionary sensation for use in factors to provide information about limb position and movement to prosthesis users. The protocol aims to integrate additional monitoring with current experimentation with the kinesthetic illusion to inform and improve development of feedback provision.

SORB16-26(CI)

BUILDING A MENTORING PROGRAM FOR ADOLESCENTS AND YOUNG ADULTS WHO USE AUGMENTATIVE AND ALTERNATIVE COMMUNICATION

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Background: Young adults who use augmentative and alternative communication (AAC) face barriers in maximizing educational and vocational outcomes, becoming active participants in society and realizing a high quality of life. Mentoring has been used to connect experienced people (mentors) with less experienced people (protégés) to help with daily life activities. Albertan AAC users deserve to have opportunities to participate in these relationships. Before pairing mentors with protégés, individuals identified as potential mentors should receive training to build their leadership capacity. **Objective:** Create a regionally contextualized AAC Mentorship Training Program that is web-based, supported by trained instructors and provides opportunities for supervised practice of targeted skills. **Method:** This project used an action research approach with individuals who use AAC as members of the research team. Mentors were invited to become instructors of the AAC Mentor Training Course to build sustainability. The Penn State University training materials to establish a mentoring program for people with communication difficulties was used. Participants moved through the lessons using a distance learning format. Upon completion, mentors are matched with protégés. **Result:** Pre-testing and post-testing protocols were developed. Pre-testing and post-testing of role play situations were completed. Comparison of participant's pre and during training data showed improvements. **Conclusion:** Data collection is ongoing. It is expected that trained mentors will be better prepared to assist young adults who use AAC to achieve goals, develop relationships and participate in meaningful activities. If such mentorship training meets the needs of Albertans who use AAC, it will continue to be provided as an ongoing, self-sustaining service.

SORB16-27(AR)

PRIMARY PROGRESSIVE APHASIA: A REPORT ON TWO CASES

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Background: Primary Progressive Aphasia (PPA) is a clinical syndrome with speech deficits as initial presentation. With increasing prevalence of dementia in the aging population, the diagnosis of PPA may be missed. **Objective:** We will describe 2 cases of Primary Progressive Aphasia in older adults and review relevant literature. **Method:** This is a report of 2 cases of Primary Progressive Aphasia. **Result:** *Case 1:* An 83-year-old lady had a 3-year history of progressive language difficulties with no behavior symptoms. Her speech was fluent but had pauses and difficulty in word finding. On examination, the MMSE was 7/30, GDS was 4/15, and there was a mild deficit in short-term memory and a mild impairment in visual-spatial abilities. She had diabetes and hypertension. The CT scan showed cortical and medial-temporal atrophy. *Case 2:* A 65-year-old male had a 2-year history of dysphasia: he had difficulty expressing himself and needed cueing. This progressed to difficulties in memory and calculation. He could write short notes but struggled with paragraphs. The PET Scan showed an advanced neurodegenerative disorder with preservation of metabolism at the posterior cingulate gyrus. Both cases were managed with cholinesterase inhibitors, speech therapy, referral to geriatric psychiatry, and caregiver support. **Conclusion:** Primary Progressive Aphasia is a syndrome that needs to be differentiated from other geriatric syndromes to ensure appropriate and supportive care.

SORB16-28(AR)

DECISION-MAKING CAPACITY ASSESSMENT EDUCATION FOR PHYSICIANS: CURRENT STATE AND FUTURE DIRECTIONS

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Background: A person's capacity to make personal/financial decisions is an important component of independence. Family physicians, because of their longstanding relationships and familiarity with patients, are well-positioned to assess this capacity. **Objective:** The objective of this pilot study was to examine the training needs of family physicians (FPs) regarding Decision-Making Capacity Assessments (DMCAs) and ways in which training materials, based on a DMCA Model, might be adapted for use by FPs. **Method:** We did a scoping review of the literature to examine the current status of physician education regarding assessment of decision-making capacity (DMC). Also, we conducted a focus group and interviews with Albertan FPs to ascertain the educational needs of FPs in this area. **Result:** Based on the scoping review of the literature, four main themes emerged: increasing saliency of DMCAs due to an aging population, sub-optimal DMCA training for physicians, inconsistent approaches to DMCA, and tension between autonomy and protection. The findings of the focus groups and interviews indicate that, while FPs working as independent practitioners or on inter-professional (IP) teams are motivated to engage in DMCAs and utilize the DMCA Model for those assessments, several factors impede them from conducting DMCAs. The most notable factors are a lack of education, isolation from IP teams, uneasiness around managing conflict with families, fear of liability, and concerns regarding remuneration. **Conclusion:** This pilot study has helped to inform ways to better train and support FPs conducting DMCAs. FPs are well-positioned, with proper training, to effectively conduct DMCAs. To engage in the process, however, the barriers should be addressed.

SORB16-29(CI)

THE MOBILI-T: THE DEVELOPMENT OF A SWALLOW-DETECTION ALGORITHM FOR REMOTE SWALLOWING THERAPY

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Background: Dysphagia, or swallowing impairment, occurs in two thirds of head and neck cancer patients and has been linked to

decreased quality of life. Clinicians prescribe exercise regimens but access to therapy is limited and many patients feel that they would benefit from additional access to resources. The Mobili-T[®] is a device for remote swallowing therapy designed for independent, home-use by head and neck cancer patients using surface electromyography (sEMG) sensors to detect muscle activity. However, sEMG signal can become confounded with muscle contractions during saliva collection and other preparatory movements, potentially resulting in false swallow detections. To prevent this, a dual-stage algorithm was developed to automatically differentiate swallow and non-swallow events. **Objective:** To develop and evaluate an automated swallow-detection algorithm for the purpose of home-based swallowing therapy. **Method:** The recall and precision of the algorithm are currently being evaluated with data collected using the Mobili-T[®] on a group of 6 healthy participants (balanced for age and sex) during swallow and non-swallow tasks. **Result:** Algorithm performance will be reported separately for all 6 participants. However, preliminary data from one healthy participant during 15 swallow and 35 non-swallow tasks showed both a recall and precision of 93%. **Conclusion:** A mobile therapy device has been developed and is being evaluated for its ability to provide accurate feedback in healthy participants. Future testing will evaluate the performance of the Mobili-T[®] with head and neck cancer and stroke participants and will identify signal differences between the two populations.

SORB16-31(AR)

LANGUAGE USE DURING MATHEMATICS ACTIVITIES: DIFFERENCES BETWEEN DIRECTING AND DOING HANDS ON PORTIONS USING A ROBOT

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Background: For students who use augmentative and alternative communication directing peers to manipulate objects can result in increased participation in activities. The expected vocabulary needed includes vocabulary for directing others and asking for help. It is possible that students would need less "helping" vocabulary while using a robot because they could do part of the hands-on tasks themselves. **Objective:** To determine whether participants would use less 'task completion' language (i.e., asking for help) when they used a robot for hands-on tasks; and to determine unique vocabulary that would be needed to support students using an AAC system in math activities. **Method:** The participant and student partner performed math measurement tasks. In the baseline condition, they performed the activity as they usually would. In the intervention condition the participant used the robot, with the partner helping as requested. Utterances were coded into four categories: 'Math-related', 'Task completion', 'Task-related', 'Unrelated'. **Result:** For Participant 1 the ability to move objects with his own hands resulted in task completion utterances in both conditions which were requests to be given objects that were out of reach. For Participant 2 task completion language changed with the introduction of the robot to include more specific directions for the measurement procedure. **Conclusion:** Task-related language was the highest proportion of language used for both participants in both conditions. Proportion of task completion language was higher for Participant 2 than Participant 1 in both conditions, possibly due to more significant physical limitations. The robot did not necessarily reduce the need for "helping" vocabulary.

SORB16-32(CI)

THE FEASIBILITY AND EFFECTS OF OVER GROUND EXOSKELETON TRAINING IN PERSONS WITH PROGRESSIVE MULTIPLE SCLEROSIS: A PILOT STUDY

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Laura Mumme, Knowledge Mobilization, Glenrose Rehabilitation Hospital

Background: Regaining the ability to walk is a commonly expressed primary physical therapy goal of patients with Progressive Multiple Sclerosis (PMS) who are marginally ambulatory or unable to ambulate. Presently there are few treatment options targeting walking for patients with Progressive Multiple Sclerosis [22]. Currently a cutting edge external skeleton is being introduced into physical therapy practice at the Glenrose Rehabilitation Hospital (GRH) for patients with spinal cord injury, stroke or brain injury. **Objective:** The focus of this study is to determine if the provision of exoskeleton training for patients with Progressive Multiple Sclerosis is feasible at the Glenrose and to observe general trends in functional parameters. **Method:** In this pilot feasibility study 10 subjects will be recruited from a GRH outpatient clinic and screened to establish if they meet eligibility requirements. If eligible they will receive EKSO training, functional outcome data will be collected along with subjective data and feasibility data such as adverse events. **Result:** The results of this study will be used to inform future use of the EKSO with patient populations at the GRH and will guide future larger research projects. Information learned will be shared with other sites in Alberta and internationally. **Conclusion:** This is an ongoing project

using a clinically innovative approach to evaluating and implementing technology in a rehabilitation setting. To date this team has presented the implementation strategy at the International EKSO Bionics Conference in 2015 and looks forward to presenting again in the fall of 2016. At the end of the three year initiative the team will have information in order to guide decisions regarding future use of this technology.

SORB16-33(CI)

INTEGRATION OF AN EXTERNAL SKELETON INTO CLINICAL PRACTICE AT THE GLENROSE REHABILITATION HOSPITAL: THE FIRST YEAR REPORT

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Background: Increasingly clinicians are challenged to evaluate and incorporate cutting edge technologies into their practice in order to maximize rehabilitation services. In 2014 the Glenrose Foundation purchased the EKSO Bionics external skeleton to give neurological patients the opportunity to experience a safe and efficient method of core and gait training. A front line team used the principles of Implementation Science to incorporate this external skeleton into clinical practice at the Glenrose Rehabilitation Hospital. **Objective:** To report on the feasibility of using the EKSO external skeleton with inpatients and outpatients at the Glenrose Rehabilitation Hospital in Edmonton. **Method:** An interdisciplinary team used a framework based in the principles of Implementation Science to incorporate a new rehabilitation technology into clinical care. **Result:** This project is in its first of three years and has preliminary information to share regarding the process of implementation and trends of use. **Conclusion:** This is an ongoing project using a clinically innovative approach to evaluating and implementing technology in a rehabilitation setting. Using the Implementation Science Framework has provided structure to systematically address feasibility and sustainability of using EKSO in our clinical setting. At the end of the three year initiative the team will have information in order to guide decisions regarding future use of this technology.

SORB16-34(AR)

STANDARD ORDERS FOR PRESSURE ULCER PREVENTION BASED ON BRADEN RISK ASSESSMENT SUBSCALES

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Background: Implementing pressure ulcer prevention evidence successfully and sustainably requires a purposeful, active, and evidence based implementation framework. Implemented interventions will be based on evidence from Prevention & Treatment of Pressure Ulcers: Clinical Practice Guideline (NPUAP 2014). Standard order sets will be based on the Braden risk assessment subscales: sensory, moisture, activity, mobility, nutrition, friction and shear. A site implementation team has developed practice profiles that outline ideal and acceptable implementation as well as outcomes and indicators for achieving implementation goals and implementation fluency. **Objective:** The purpose of this research is to examine the implementation of standard order sets for pressure ulcer prevention across inpatient units at Glenrose Rehabilitation Hospital (GRH), using the National Implementation Research Network (NIRN, 2013) active implementation framework. **Method:** All inpatients at GRH will have a pressure ulcer risk assessment using the validated Braden Risk Assessment scale completed within 24 hours of admission, weekly for 4 weeks, monthly until discharge, and with a change in patient and patients with a reduced score on any of the Braden Risk assessment Subscales (sensory, moisture, activity, mobility, nutrition, friction and shear), will have evidence based standard orders for pressure ulcer prevention. **Result:** Preliminary results from pilot studies will be presented. **Conclusion:** This research demonstrates how a structured implementation science framework builds sustainable pressure ulcer prevention practice using standard order sets based on the Braden subscales.

SORB16-35(AR)

IMPLEMENTING BEST PRACTICE FOR PAIN IN SCI: WHAT ARE THE INDICATORS TELLING US?

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Background: For many spinal cord injury (SCI) patients, pain has a significant impact on quality of life, with over 50% of patients developing chronic pain. Best practice guidelines suggest the completion of an interdisciplinary assessment of pain including etiology, pain intensity, effect on function, and psychosocial stress. Clinicians should discuss and document the patient's concerns and expectations, the available treatment plan, coping strategies, and provide education. Implementation of these guidelines was done as part of the SCI Knowledge Mobilization Network, funded by the Rick Hansen Institute and the Ontario Neurotrauma Foundation using the National Implementation Research Network (NIRN) framework. **Objectives:** 1) To systematically implement best practice guidelines using the NIRN framework. 2) To evaluate the success of implementation by examining indicators based on chart audits. 3) To examine the impact of pain on day-to-day activities, mood and sleep. **Method:** The NIRN framework provided tools for outlining critical components of best practices and process and outcome indicators. A Site Implementation Team including leadership, front-line clinicians, and a Knowledge Mobilization Specialist developed an implementation plan to address key implementation drivers such as training, communication, and data support systems, as well as a system for capturing process and outcome indicators. **Result & Conclusion:** Initial data collection indicates: a) Implementation of an interdisciplinary pain assessment has been successful, b) Patients report that pain interfered less with day-to-day function, sleep, and mood just prior to discharge than on admission.

SORB16-36(AR)

PREVENTING REGRESSION IN FUNCTION: HELP FIND A WAY

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Background: The "early years" (0-5), are recognized as the period of greatest brain vulnerability to adverse events, including early complex therapies, and the period of greatest return on investment from preventing and managing adverse developmental outcomes. **Objective:** a) To determine the extent to which functional regression occurs in young children after complex therapies, b) To develop a practical, workable program of intervention to prevent regression in the developmental trajectory. **Method:** Within the Complex Pediatric Therapies Follow-up Program we determined a mean lack of expected progression of functional skills and a regression of skills (>1SD in scaled scores) using the parent-completed Adaptive Behavioral Assessment System II (ABAS II), given at 2-,4-, and 8-years of age. Focus Groups consisting of health care professionals, allied health workers and parents engaged in active dialogue about prevention of regression under the sub-topics of: at the bedside, in follow-up, early childhood, school-readiness, and school age. **Result:** Functional Pre-academic and Academic scores showed a mean lack of expected progression of skills and some real regression of skills, that is, a loss of ability and a dropping off of raw scores. The Focus Groups yielded well-organized and helpful approaches to intervention. **Conclusion:** Lack of progression and regression of skills occur in children after complex therapies. Evaluation and intervention for functional deficits for these children requires collaborative care early on in the child's life trajectory. This study informs our developing framework to enable all children to have support both before and after school entry.

SORB16-37(CI)

NURTURING AUTHENTIC PARENT ENGAGEMENT: FAMILIES CO-LEADING THE DEVELOPMENT OF A TRANSITIONAL PORTAL

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Background: The Glenrose Rehabilitation Hospital's focus on patients and families participating in critical decision making has resulted in new levels of engagement. Parents have identified that, as their children start to access adult services, they often have difficulty navigating existing resources in a very complex, fragmented adult system. This poster describes how parent perspectives were used as the foundation for the development of a website to address this issue. **Objective:** The aim of our quality improvement project was to increase the capacity of youth and their families to successfully navigate the transition to adulthood. The objective was to develop a Transitions Web Portal that aligned with parent/staff co-created transition planning guidelines and was more interactive than the traditional resource repository model. **Method:** With assistance from a Canadian Foundation for Healthcare Improvement grant, a

website development firm was contracted. The development process began with Glenrose staff interviews. To ensure authentic engagement, five parent volunteers were recruited to interview 21 families. The parents then partnered with clinicians to identify themes and co-design the portal features. **Result:** Families provided valuable insights that have contributed to an emerging model of patient and family engagement with relevance across projects and disciplines. **Conclusion:** Listening to how families wanted to participate in the portal development became the driver for effective collaboration and engagement. When offered an opportunity for authentic collaboration, parents generously dedicated their time and expertise. This initiative resulted in a co-constructed portal with relevance for families and clinicians addressing the transition to adulthood.

SORB16-38(AR)

3D GAIT ASSESSMENT AND TEMPORAL EVENTS DETECTION USING INERTIAL SENSORS

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Background: Prevention of loss of functional abilities is a major concern for clinicians. In order to improve the quality of life for older people it is required to monitor functional ability under real-life condition. Gait parameters and their variability are widely used as indicators of mobility. Spatio-temporal gait assessment requires dedicated laboratory with sophisticated motion capture equipment. However, ambulatory devices have facilitated the process by using body-fixed sensors which can measure and analyze gait kinematics.

Objective: In light of the above-mentioned considerations, this study will pursue two objectives: (1) To develop algorithms to obtain spatio-temporal gait parameters at each gait cycle based on the computation of the 3D foot kinematics using inertial measurement units (IMU's), (2) To develop a Graphical User Interface for 3D gait assessment. **Method:** This project involves reading from two IMU's, fixed at fore-foot position using medically-approved anti-allergic appropriate tools. These sensors record each foot acceleration and angular velocity during a gait test. The method is based on temporal event detection. Sensor fusion algorithms were used to calculate synchronized three-dimensional (3D) feet trajectories. **Result:** Synchronized 3D trajectories were used to obtain clinically meaningful gait parameters. An Excel file was generated to report these parameters for each gait cycle. **Conclusion:** 3D ambulatory gait assessment can help us measure aspects of human gait under real-life conditions. We developed an algorithm and a software package

SORB16-40

DEVELOPING A GRAPHICAL USER INTERFACE TO MONITOR SHOULDER MOTION USING WEARABLE SENSORS

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Background: A patient's shoulder mobility and shoulder function before and after treatment of shoulder conditions are commonly evaluated using observations or questionnaires. However, these methods are subjective and not sensitive to small changes. Motion capture systems can provide an objective method of evaluation; however, they require space and trained personnel to operate. Wearable sensors may provide another solution for objective outcome evaluation of shoulder conditions. **Objective:** The aim of this project was to develop a novel wearable system for objective shoulder motion evaluation over several hours of daily life. **Method:**

Inertial sensor modules were placed on the upper arm to calculate motion parameters during daily activities. A Graphic User Interface (GUI) was developed using MATLAB for data analysis and calculation of outcome metrics related to shoulder function. **Result:** The developed GUI generated kinematic parameters describing mobility and agility of shoulder function such as shoulder elevation level and angular velocity of the arm. Bilateral symmetry of the measured parameters was suggested as an outcome metric. These parameters were reported in an Excel file for every minute of measurement to assess their variation throughout daily life. **Conclusion:** We developed a wearable system and a software package for monitoring and evaluating shoulder motion in the long-term. Clinicians can use this system to assess minute-to-minute variations in kinematics, power, working level and activity of both shoulders. In the future, we will assess the accuracy, responsiveness and convergent validity of the obtained outcome measures for various pathological shoulder conditions.

SORB16-42(AR)**DESIGN AND PRELIMINARY TESTING OF HAPTICS-ASSISTED ROBOT PLATFORMS FOR PLAY BY CHILDREN WITH PHYSICAL IMPAIRMENTS**

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Background: Development of children's cognitive and perceptual skills depends heavily on object exploration and experience in their physical world. For children who have severe physical impairments, one of the biggest concerns is losing opportunities for meaningful play with objects. Simple robots can be used to perform object manipulation. Haptics Virtual Fixtures (VFs) in the form of assistance as software-generated forces could help children explore the environment using robots. **Objective:** This study aims to develop a robot with VFs to help children with physical disabilities accomplish playful manipulation tasks. **Method:** Object sorting tasks were performed by 10 non-disabled adults and 1 adult with cerebral palsy (CP). Performance was compared between tasks with VFs and non-VFs in terms of success rate, completion time, and area of hand movement. **Result:** The tasks with VFs for all the participants achieved 100% success rate. There was a significant difference in the area of movement between the two conditions, non-VFs having a larger area of movement. Tasks done with VFs were faster than non-VFs overall, however, for the individual with CP, two out of three tasks were slower during the task with VFs. **Conclusion:** The results of this study indicate that VFs were able to restrict a user's hand movement inside a defined region to help to improve the efficiency of the movement. However, the results also suggest that the VFs are not always able to improve user speed. VFs should be aligned with user's motion characteristics and determined uniquely for each individual.

SORB16-43(AR)**COMPARISON OF ANATOMICAL AND CLUSTER-BASED UPPER BODY MARKER MODELS**

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Background: Quantitative analysis of upper body motion is a beneficial tool for assessing function. Joint kinematics are typically quantified using a motion capture system, tracking a set of reflective markers. Generally, these marker sets use single markers attached to anatomical bony landmarks. An alternative method uses rigid marker clusters fixed to upper limb segments. Clusters are simpler to attach while potentially reducing errors associated with marker placement. Previous work has demonstrated the validity of this method in the lower limbs; however, upper limb motion is more complex. **Objective:** Investigate the validity of three different rigid cluster models (RCM) for obtaining upper body kinematics during two functional upper limb tasks by: 1) Comparing their outputs against those of a gold-standard anatomical marker model (*An*); 2) Assessing the intra-rater reliability of the three RCM as well as *An*. **Method:** Twenty able-bodied participants performed two standardized upper limb tasks with a combination of anatomical and rigid cluster markers affixed to their upper body. Angular joint kinematics were computed and compared for the three RCM and one *An*. Ten participants returned for a repeatability comparison. **Result:** Visual inspection suggests comparable kinematic patterns for all models, although offsets exist at some degrees of freedom. All three RCM show comparable correlation with *An*. Additionally, the intra-rater reliability is comparable for all models. However, the models should not be used interchangeably to compare kinematic metrics. **Conclusion:** When assessing upper body kinematics, RCM were found to be a valid alternative to *An* when repeatability, trajectory variability, and ease-of-use are the main priorities.

SORB16-44(AR)**RELIABILITY OF ILLINOIS AGILITY TEST FOR WHEELCHAIR USERS**

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Background: Illinois Agility Test (IAT) is a standard cone obstacle course used to test the agility for training and assessment purposes. It has been shown to be reliable for the able-bodied population, but using it as a reliable tool for wheelchair users have never been shown. **Objective:** The purpose of this study is to investigate the test-retest reliability of IAT to assess wheelchair propulsion.

Method: A convenient sample of 11 able-bodied subjects gave a written consent to participate in the protocol approved by Human Ethics Board of University of Alberta. Each participant had two visits that were at least one week apart. At each visit they performed four trials of IAT. After checking for normality of the data, the test-retest reliability of 16 variables was calculated using Intra-Class Correlation coefficient (ICC(2,4)) between the average of the scores obtained in the first and second session. **Result:** The 16 variables tested throughout the path were peak and average magnitude of tangential and total force, velocity and acceleration, both for the left and the right side. The average ICC of variables was 89%. Also, the average confidence interval was [44%, 96%]. **Conclusion:** It was shown that IAT is a reliable tool to test wheelchair agility for 15 variables tested for non-wheelchair users. Since wheelchair users are much more consistent in wheelchair propulsion compared to non-wheelchair users due to their experience the results of this study show that IAT can be used as a reliable tool to assess and train wheelchair users, both for clinical and athletic applications.

SORB16-45(AR)

EFFECTIVENESS OF HAND SELF-SHIATSU FOR POST SPORT-RELATED CONCUSSION SLEEP DISTURBANCE IN YOUNG ATHLETES

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Background: One important, but under-addressed area related to sport-related concussion (SRC) is sleep. Lacking of sleep is also considered as a risk factor for many other health issues. Furthermore, the risk of SRC and sleep problems appears to be bidirectional. Hand self-Shiatsu (HSS) is a form of Complementary and Alternative Medicine (CAM). This no-equipment, self-management approach is accessible for athletes and can promote self-efficacy. Currently, promising outcomes of HSS were found in a pilot study and more evidence requires building. The literature suggests that HSS is an approach worth studying further to help reduce sleep problems in larger studies of various patient populations. **Objective:** To test the health promotion technique of HSS as a self-management approach promoting sleep onset and maintenance in young athletes with self-reported sleep problems after SRC. **Method:** This study will use a prospective consecutive case series study design. After a 7-day sleep diary and baseline actigraphy (Actigraph wGT3X-BT) data collection, the participants will be taught how to apply the standardized HSS technique and instructed to use it every night before bed. Follow-up data collection will be at the 4th and 8th week. Additional standardized sleep and CAMs questionnaires will also be included at baseline and follow-up to collect data about self-reported sleep quality, daytime fatigue and the attitudes toward HSS. **Result:** The study is being conducted. **Conclusion:** Potential significance may include: 1) help build the evidence for the effectiveness, efficacy and accessibility of HSS. 2) Promote awareness and understanding of concussion, sleep and CAM.

SORB16-46(CI)

ELECTRICAL STIMULATION ENHANCES AXON REGENERATION AND FUNCTIONAL RECOVERY FOLLOWING CUBITAL TUNNEL SURGERY IN HUMANS

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Background: Patients with severe cubital tunnel syndrome often have poor functional recovery with conventional surgical treatment. Brief postoperative electrical stimulation (ES) enhances motor and sensory axonal regeneration in humans following carpal tunnel release and repair of digital nerve transection. **Objective:** The goal of this study was to determine if ES following cubital tunnel surgery in patients with severe ulnar neuropathy would result in better muscle reinnervation and functional recovery compared to surgery alone. **Method:** Patients with severe axonal loss from ulnar nerve compression at the elbow were randomized in a 2:1 ratio to the stimulation or control groups. Control patients received cubital tunnel surgery alone, while patients in the stimulation group received 1 hour of 20Hz ES following surgery via two electrodes implanted intraoperatively. Patients were followed yearly for 3 years. Muscle reinnervation was quantified using motor unit number estimation (MUNE) and functional recovery was evaluated using grip and key pinch strength. **Result:** Twenty-four patients were enrolled with 8 receiving surgery alone and 16 receiving surgery and ES. Three years following surgery, MUNE was significantly higher in the ES group (176 ± 23 , mean \pm SE) compared to controls (88 ± 11 , $p < 0.05$). Grip strength and key pinch strength were significantly improved in the treatment group (43 ± 3 kg, 5.2 ± 0.5 kg) at 3 years post-operatively compared to controls (39 ± 3 kg, 4.4 ± 0.8 kg, $p < 0.05$). **Conclusion:** ES enhances axonal regeneration, muscle reinnervation and functional recovery following cubital tunnel surgery in humans. ES may be a clinically useful adjunct to surgical decompression for severe ulnar neuropathy, where functional recovery with conventional treatment is poor.

SORB16-47(CI)**THE IMPORTANCE OF ANTHROPOMETRIC MEASURES FOR REHABILITATION PATIENTS: EVALUATION OF A PRACTICE BEHAVIOUR CHANGE**

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Background: Knowing a patient's height, weight and waist circumference (anthropometrics) are important to provide a safe and accessible health care environment, particularly for patients with obesity. This information is often missing in the patient record. **Objective:** The objective of this study was to evaluate the uptake of a new protocol on two units at the Glenrose Rehabilitation Institute (GRH) in which staff were to collect anthropometrics on every patient admitted and to record the results in the patient file. **Method:** The study took place June 1 – September 30, 2015. Training sessions on how to measure patient height, weight and waist circumference was provided to staff by members of the research team. Staff was asked to calculate the BMI of each patient using an on-line BMI calculator for patients with and without amputations. Information was recorded on a data sheet and leave it in the front of the patient's chart. Data was analyzed using SPSS. **Result:** 125 patients were admitted of which 37 (29.6%) had all required measurements recorded. Height and weight were recorded in 32.8% (n=41) patients. Amputation status (yes or no) was missing for 8 of the 37 patients. Errors in the calculation of BMI recorded by clinicians occurred in 19.5% of the sample with a trend toward under-estimating BMI. **Conclusion:** The uptake of taking and recording anthropometric measures on patients was low and with errors. This type of missing data has implications for quality patient care and research. Interventions are needed to improve the collection of anthropometric data.

SORB16-48(AR)**PERCEPTUAL DISCONNECT IN PD AFFECTS VOCAL QOL AND INTELLIGIBILITY RESULTS**

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Background: A common perceptual problem associated with Parkinson's disease (PD) is difficulty matching appropriate effort level with audible speech/voice loudness. In other words, perception of their own loudness by persons with PD is not accurate and as a result they produce a quiet voice instead of an audible voice. Treatment involves coaching people with PD to increase effort level, helping them re-condition their vocal mechanism (larynx, pharynx, lungs) and teaching them to use greater effort (especially abdominal breath support) than they think they should. **Objective:** To examine the effect of a group voice and singing therapy program on the vocal QOL and speech intelligibility of people with PD using two self-assessment questionnaires. **Method:** A single group pretest-posttest study design was used (n= 28). Participants completed questionnaires before and after attending two 90-minute sessions/week for 6 weeks. The changes in scores between pretest and posttest were compared with repeated measures MANOVA using the SPSS software. **Result:** Both questionnaires were significant but the effect size for the *Speech Intelligibility Inventory (SII)* was much greater. The questions on the *SII* ask the respondent how others perceive his/her speech, whereas the *Voice Related Quality of Life (V-RQOL)* questions focus on only the person's perception of his/ her speech. **Conclusion:** Feedback from others about speech/voice appears to be a better indicator of improvement than just self-perception of speech/voice for people with PD.

SORB16-49(AR)**IMPROVING MARKER-LESS SURFACE TOPOGRAPHY ASYMMETRY MEASUREMENTS FOR ADOLESCENTS WITH IDIOPATHIC SCOLIOSIS (AIS)**

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Background: Adolescent Idiopathic Scoliosis (AIS) is a 3D spinal deformity common in females. Markerless surface topography analysis can be used for diagnosing and monitoring spinal deformity using visible light instead of harmful X-Ray radiation. In previous studies, the asymmetry analysis of the torso, represented as a map with color patches outlining the areas of cosmetic asymmetries, was shown to accurately predict the severity in comparison with radiographs. Similarly, asymmetry analysis of changes in the maximal deviations and root mean square (RMS) of deviations within the color patches helped predict which patients had curve progression on radiographs. However, while sensitive the method was not very specific. **Objective:** The objective of this study is to modify the patch

isolation method and improve the match between region where asymmetry parameters are extracted and the location of the curves. **Method:** We modified the algorithm which isolates the patches and increased the number of patients and criteria to improve the congruence between patch location and location of curves. **Result:** Data noise near the armpits no longer has an effect on the asymmetry parameters. The results for the MaxDeviation and RMS will allow the automation of this procedure without any user interference. In addition, the number of isolated patches exactly matched the number of curves on X-Rays. **Conclusion:** The results demonstrate that this new method can perfectly isolate the color patches with no extension in areas corresponding to other curves. This demonstrates a final step towards full automation of the method.
